

We Claim:

1. An imaging method comprising:
 - displacing an imaging device in one dimension while acquiring an image of an object, thereby blurring the image; and
 - deconvolving the blurred image to generate a multidimensional representation of the object.
2. An imaging method comprising:
 - varying the focus of an imaging device while acquiring an image of an object, thereby blurring the image; and
 - deconvolving the blurred image to generate a representation of the object.
3. The method of claim 2, the representation comprising a two dimensional projection image of three dimensions of the object.
4. The method of claim 2, the imaging device comprising a fluorescence imaging device.
5. The method of claim 2, varying the focus occurring while a shutter of the imaging device is open.
6. The method of claim 2, varying the focus comprising varying an input voltage to a piezoelectric focusing mechanism of the imaging device.
7. The method of claim 2, varying the focus comprising applying signals to a piezoelectric focusing mechanism of the imaging device to generate oscillatory movement of the focusing mechanism.

8. The method of claim 2, varying the focus comprising launching a velocity-controlled focus change using the a stand-based focusing mechanism.

9. The method of claim 2, acquiring the image being accomplished in two or more stages.

10. An imaging method comprising:

- (a) collecting an acquired image of an object using an imaging device;
- (b) varying the focus of the imaging device while collecting the acquired image, thereby blurring the acquired image;
- (c) determining a point spread function (PSF) associated with the imaging device;
- (d) determining an optical transfer function (OTF) using the PSF;
- (e) determining an object estimate;
- (f) convolving the object estimate with the PSF, using the OTF, to generate an estimated image;
- (g) comparing the estimated image with the acquired image to obtain a ratio;
- (h) convolving the ratio with a mirror image of the PSF, using a complex conjugate of the OTF, to form a convolved ratio;
- (i) multiplying the object estimate with the convolved ratio to form an updated object estimate; and
- (j) repeating steps (f) through (i) one or more times to generate a two dimensional projection image of three dimensions of the object from the updated object estimate.

11. The method of claim 10, the imaging device comprising a fluorescence imaging device.

12. The method of claim 10, the imaging device comprising a photosensitive camera chip.

13. The method of claim 10, collecting the acquired image comprising stopping a continual clearing of the imaging device.
14. The method of claim 10, collecting the acquired image comprising opening a shutter of the imaging device.
15. The method of claim 14, varying the focus occurring while a shutter of the imaging device is open.
16. The method of claim 10, varying the focus comprising varying an input voltage to a piezoelectric focusing mechanism of the imaging device.
17. The method of claim 10, varying the focus comprising applying signals to a piezoelectric focusing mechanism of the imaging device to generate oscillatory movement of the focusing mechanism.
18. The method of claim 10, varying the focus comprising launching a velocity-controlled focus change using the a stand-based focusing mechanism.
19. The method of claim 10, acquiring the image being accomplished in two or more stages.
20. An imaging system, comprising:
 - an imaging device configured to vary its focus while acquiring an image of an object; and
 - a processor in operative relation with the imaging device and configured to execute machine-readable instructions for deconvolving a resulting blurred image to generate a representation of the object.

21. The system of claim 20, the representation comprising a two dimensional projection image of three dimensions of the object.

22. The system of claim 20, the imaging device comprising a fluorescence imaging device.

23. The system of claim 20, the instructions comprising instructions for:

- (a) determining a point spread function (PSF) associated with the imaging device;
- (b) determining an optical transfer function (OTF) using the PSF;
- (c) determining an object estimate;
- (d) convolving the object estimate with the PSF, using the OTF, to generate an estimated image;
- (e) comparing the estimated image with the acquired image to obtain a ratio;
- (f) convolving the ratio with a mirror image of the PSF, using a complex conjugate of the OTF, to form a convolved ratio;
- (g) multiplying the object estimate with the convolved ratio to form an updated object estimate; and
- (g) repeating steps (d) through (g) one or more times.

24. A retrofit kit for converting an imaging system, comprising:

means for allowing an imaging device to vary its focus while acquiring an image of an object; and

means for deconvolving a blurred image to generate a two dimensional projection image of three dimensions of the object.